

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in this application.

LISTING OF CLAIMS:

Claims 1-9 Canceled.

10. (New) A negative pressure type booster device comprising:
- a booster shell movably supporting a partition member which partitions the interior of the booster shell into a variable pressure chamber and a constant pressure chamber;
 - a valve piston secured to the partition member at a base portion thereof and having a negative pressure valve seat formed thereon for selective communication of the variable pressure chamber with the constant pressure chamber;
 - an output rod connected to the valve piston;
 - a reaction member for transmitting an output of the partition member depending on the pressure difference between the variable and constant pressure chambers, from the valve piston to the output rod;
 - a plunger operable in connection with the reaction member and having an atmosphere valve seat formed thereon;
 - an input rod connected to the plunger for axially moving the plunger when the input rod is axially moved by a brake pedal;

a valve member having a negative pressure valve and an atmosphere valve formed thereon, the negative pressure valve being contactable with the negative pressure valve seat of the valve piston for making the variable pressure chamber communicate selectively with the constant pressure chamber, the atmosphere valve being contactable with the atmosphere valve seat of the plunger for making the variable pressure chamber communicate selectively with the atmosphere; and

a silencer disposed in a passage for leading the atmospheric air to the atmosphere valve;

wherein a secondary passage communicating directly with the atmosphere is formed between an internal surface of a sliding cylindrical portion of the valve piston and an external surface of the silencer for enabling the atmospheric air to be admitted from the secondary passage to the variable pressure chamber when the input rod is advanced beyond a predetermined distance relative to the valve piston.

11. (New) The negative pressure type booster device as set forth in Claim 10, further comprising a filter element provided in the secondary passage and being smaller in air path resistance than the silencer.

12. (New) The negative pressure type booster device as set forth in Claim 10, further comprising:

a cylindrical member arranged between the internal surface of the sliding cylindrical portion of the valve piston and the external surface of the silencer to define the secondary passage; and

closing means for closing the communication of the secondary passage with the atmosphere valve seat at the time of an ordinary braking, but making the communication of the secondary passage with the atmosphere valve seat when the input rod is advanced beyond the predetermined distance relative to the valve piston.

13. (New) The negative pressure type booster device as set forth in Claim 12, wherein the cylindrical member is provided at an intermediate portion thereof with a stepped portion on which a communication passage opens to communicate with the secondary passage and wherein the closing means comprises:

a bypass valve member contactable to the stepped portion of the cylindrical member for closing the communication passage;

an urging member for urging the bypass valve member in a direction toward contact with the stepped portion of the cylindrical member; and

an operating portion extending from the input rod for pushing the bypass valve member forward against the resilient force of the urging member to open the communication passage when the input rod is advanced beyond the predetermined distance relative to the valve piston.

14. (New) The negative pressure type booster device as set forth in Claim 13, wherein the operating portion extending from the input rod extends in a radial direction perpendicular to a swing motion direction of the input rod given by the brake pedal.

15. (New) The negative pressure type booster device as set forth in Claim 12, wherein the cylindrical member is circumferentially positioned relative to the valve piston, the negative pressure type booster device further comprising:

an operating member provided coaxially with the input rod and radially extending an operating portion;

a position restriction portion provided on the cylindrical member for restricting the movement of the operating member relative to the cylindrical member in the circumferential direction

wherein the operating member has a guide aperture for allowing the input rod to swing but restricting the relative movement of the input rod in a radial direction perpendicular to the swing motion direction of the input rod.

16. (New) The negative pressure type booster device as set forth in Claim 10, further comprising:

a bypass valve member for selectively controlling the communication of the secondary passage with the atmosphere valve seat;

an operating member provided coaxially with the input rod for operating the bypass valve member to make the secondary passage communicate with the atmosphere valve seat when the input rod is advanced beyond the predetermined distance relative to the valve piston and having a round inner hole which does not interfere with the input rod during the swing motion of the same; and

a pair of slide guiding members provided on the input rod for guiding the operating member to be slidable radially relative to the input rod and for restraining the rearward position of the operating member on the input rod.

17. (New) The negative pressure type booster device as set forth in Claim 16, further comprising:

a cylindrical member received in the sliding cylindrical portion of the valve piston to define the secondary passage between the external surface thereof and the internal surface of the sliding cylindrical portion,

wherein a communication passage is formed on the cylindrical member for being selectively opened and closed by the bypass valve member, and

wherein the operating member is received within the cylindrical member with a slight clearance in radial directions.

18. (New) The negative pressure type booster device as set forth in Claim 16, wherein the operating member protrudes a plurality of slide guided portions in radial directions from the circumference thereof to define air passages between the slide guided portions.

19. (New) The negative pressure type booster device as set forth in Claim 16, further comprising a filter element provided in the secondary passage and being smaller in air path resistance than the silencer.

20. (New) A negative pressure type booster device comprising:

a booster shell movably supporting a partition member which partitions the interior of the booster shell into a variable pressure chamber and a constant pressure chamber;

a valve piston secured to the partition member at a base portion thereof and having a negative pressure valve seat formed thereon for selective communication of the variable pressure chamber with the constant pressure chamber;

an output rod connected to the valve piston;

a reaction member for transmitting an output of the partition member depending on the pressure difference between the variable and constant pressure chambers, from the valve piston to the output rod;

a plunger operable in connection with the reaction member and having an atmosphere valve seat formed thereon;

an input rod connected to the plunger for axially moving the plunger when the input rod is axially moved by a brake pedal;

a valve member having a negative pressure valve and an atmosphere valve formed thereon, the negative pressure valve being contactable with the negative pressure valve seat of the valve piston for making the variable pressure chamber communicate selectively with the constant pressure chamber, the atmosphere valve being contactable with the atmosphere valve seat of the plunger for making the variable pressure chamber communicate selectively with the atmosphere;

a silencer disposed in a passage for leading the atmospheric air to the atmosphere valve;

a cylindrical member inserted into the valve piston to define a secondary passage communicating directly with the atmosphere between the internal surface

of a sliding cylindrical portion of the valve piston and the external surface of the silencer, the cylindrical member having a stepped portion at an intermediate portion thereof and a communication passage formed to open on the stepped portion to communicate with the secondary passage;

a filter element provided in the secondary passage and being smaller in air path resistance than the silencer;

a bypass valve member movably inserted into the cylindrical member and being contactable with the stepped portion of the cylindrical member for closing the communication passage; and

a mechanism for effecting a relative displacement between the cylindrical member and the bypass valve member in connection with the axial movement of the input rod when the same is advanced relative to the valve piston beyond a predetermined distance, so that the atmospheric air from the secondary passage is led to the variable pressure chamber through the communication passage.

21. (New) The negative pressure type booster device as set forth in Claim 20, wherein the mechanism comprises:

an urging member for urging the bypass valve member in position to close the communication passage opening on the stepped portion; and

an operating member operable in dependence on the displacement of the input rod relative to the valve piston for moving the bypass valve member against the urging member.

22. (New) The negative pressure type booster device as set forth in Claim 21, wherein the operating member radially extends an operating portion in a radial direction perpendicular to a swing motion direction of the input rod, for pushing the bypass valve member forward against the urging member to open the communication passage when the input rod is advanced relative to the valve piston beyond the predetermined distance.

23. (New) The negative pressure type booster device as set forth in Claim 22, wherein the operating member has a guide aperture formed therein which is elongated in the swing motion direction of the input rod for allowing the input rod passing through the guide aperture to swing in the swing motion direction but restraining the movement of the operating member relative to the input rod in the radial direction perpendicular to the swing motion direction.

24. (New) The negative pressure type booster device as set forth in Claim 22, wherein the cylindrical member received in the internal surface of the valve piston is positioned relative to the valve piston in the circumferential direction, the negative pressure type booster device further comprising:

a position restraining portion provided on the cylindrical member for preventing the operating member from rotating relative to the valve piston in the circumferential direction.

25. (New) The negative pressure type booster device as set forth in Claim 24, wherein the position restraining portion includes:

a pair of inner ribs extending from an internal surface of the cylindrical member radially inwardly in the radial direction perpendicular to the swing motion direction to put the operating portion of the operating member therebetween in the swing motion direction.

26. (New) The negative pressure type booster device as set forth in Claim 22, wherein an operating member has a round inner hole which does not interfere with the input rod during the swing motion of the same and wherein the mechanism further comprises:

a pair of slide guiding members provided on the input rod for guiding the operating member to be slidable radially relative to the input rod and for restraining the rearward position of the operating member on the input rod.

27. (New) The negative pressure type booster device as set forth in Claim 26, wherein the operating member protrudes a plurality of slide guided portions in radial directions from the circumference thereof to define air passages between the slide guided portions.

28. (New) The negative pressure type booster device as set forth in Claim 27, wherein the operating member is received within the cylindrical member with a slight clearance in radial directions.